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# **WATER SUPPLY OUTLOOK FOR MONTANA**



**U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE**

Collaborating with

**MONTANA AGRICULTURAL EXPERIMENT STATION**

Data included in this report were obtained by the agencies named above in cooperation with Federal, State and private organizations listed inside the back cover of this report.

AS OF  
**FEB. 1, 1977**

## TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1900 snow courses in Western United States and in the Columbia Basin in British Columbia. Networks of automatic snow water equivalent and related data sensing devices, along with radio telemetry are expanding and will provide a continuous record of snow water and other parameters at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

COVER PHOTO: SNOW COURSE MEASUREMENTS BY A SURVEY TEAM IN UTAH'S WASATCH RANGE.  
ORC-254-10

### PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, West Technical Service Center, Room 510, 511 N.W. Broadway, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	Room 129, 2221 East Northern Lights Blvd., Anchorage, Alaska 99504
Arizona	Room 3008, 6029 Federal Building, Phoenix, Arizona 85025
Colorado (N. Mex.)	P. O. Box 17107, Denver, Colorado 80217
Idaho	Room 345, 304 N. 8th. St., Boise, Idaho 83702
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1220 S.W. Third Ave., Portland, Oregon 97204
Utah	4012 Federal Bldg., 125 South State St., Salt Lake City, Utah 84138
Washington	360 U.S. Court House, Spokane, Washington 99201
Wyoming	P. O. Box 2440, Casper, Wyoming 82602

### PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P. O. Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resources, Water Resources Service, Parliament Building, Victoria, British Columbia



# **WATER SUPPLY OUTLOOK FOR MONTANA**

and  
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

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MONTANA WATER SUPPLY OUTLOOK  
February 1, 1977

\* \* \* \* \*

\* Except for the northern end of the Bighorn Mountains  
\* and some small mountain ranges in central Montana the  
\* mountain snow pack is poor. Snow deposition during  
\* January continued the below average trend of recent  
\* months. In general, the amount of water stored on  
\* the mountain watersheds as snow is 20 to 60 percent  
\* of average. Most deficient areas are the Kootenai,  
\* Lower Clark Fork and Bitterroot River drainage west  
\* of the divide and Beaverhead, Bighole and Upper  
\* Yellowstone drainages east of the divide. Forecasts  
\* west of the divide are for streamflows only slightly  
\* higher than the low years of 1940 and 1941 east of  
\* the divide in southern Montana, streamflow forecasts  
\* are similar to flows that occurred in the low years  
\* of 1960, 1961, and 1966. In the more northern  
\* drainages low flows of the late 1930's and early  
\* 1940's are expected.

\* .

\* With the lack of high elevation snow, streams are  
\* expected to drop rapidly after the main snow melt  
\* period. Irrigation water supplies are expected to  
\* be short during July and August on streams without  
\* reservoir storage. In many areas, irrigation with-  
\* drawls will be able to consume the entire river  
\* flow. Extensive water conservation measures will  
\* be necessary to counteract one of the lowest snow  
\* packs and runoffs in recent time.

\* \* \* \* \*

COLUMBIA RIVER DRAINAGE

Snow. Moisture laden storms from the Pacific have not materialized so far this season. Some weather from the north has brought a small amount of light density snow. The snow buildup in the mountains is less than one-half of normal. Some areas such as the Kootenai, Lower Clark Fork and Bitterroot have received only 20 to 40 percent of normal snowfall. Snow in the higher elevation that provides late season streamflow does not contain much more water than snow in the lower and middle elevations. Most snowpacks are still granular and



are less dense than usual. Many snow courses have near minimum water content of record for this date. Soils under the snow are drier than normal over most of the area and will require some recharge from snow melt before runoff can begin.

Streamflow. Most streams are forecast to produce flows only slightly higher than the low runoffs of record set in 1940 and 1941. Streamflow this season may be similar to more recent low flow years of 1966 and 1973. Most streams are expected to produce about one-half their average streamflow during the April through September period. Irrigation demand will exceed July and August streamflow on most streams not having stored water. Farmers, ranchers and other water users should begin to evaluate their prospective water supply and begin to initiate alternatives that can reduce the impact of a low runoff year.

#### MISSOURI RIVER DRAINAGE

Snow. Except for fair to good snow pack in the smaller mountain ranges of central Montana, the water stored in the mountain snow pack is poor. Many snow courses show lowest snow pack percentages in the Jefferson River drainage and Madison River headwaters where the snow pack is only about 20 to 30 percent of average. Other areas have 40 to 60 percent of average. High elevation snow that helps hold streamflow up later in the runoff season is well below average and is lighter density than normal. Soils under the snow pack are generally drier than normal. More snow melt water than usual will be required to recharge the soils before runoff can begin.



Streamflow. April through September runoff on most streams is forecast to be close to the lowest flows on record. In the area above Canyon Ferry Reservoir on the Missouri, runoff could be a little above the low years of 1961 and 1966. In the Sun, Marias, and St. Mary's Rivers area flows will probably be like those in the early 1940's. Streamflow from the Big and Little Belt Mountains is forecast a little higher on a percentage, however still below average. Late season irrigation supplies will be limited with the demands exceeding supply on many streams not having stored water.

#### YELLOWSTONE RIVER DRAINAGE

Snow. Snow pack in the headwaters of the Yellowstone River in Yellowstone National Park is about 30 to 40 percent of average. Other areas in the Beartooth, Bridger and Crazy Mountains and Gallatin Range are higher with 50 to 60 percent snow pack. Above average snow pack exists along the north end of the Bighorn Mountains. Soils under the snow are generally drier than normal. This will require some snow melt water for recharge before runoff can begin.

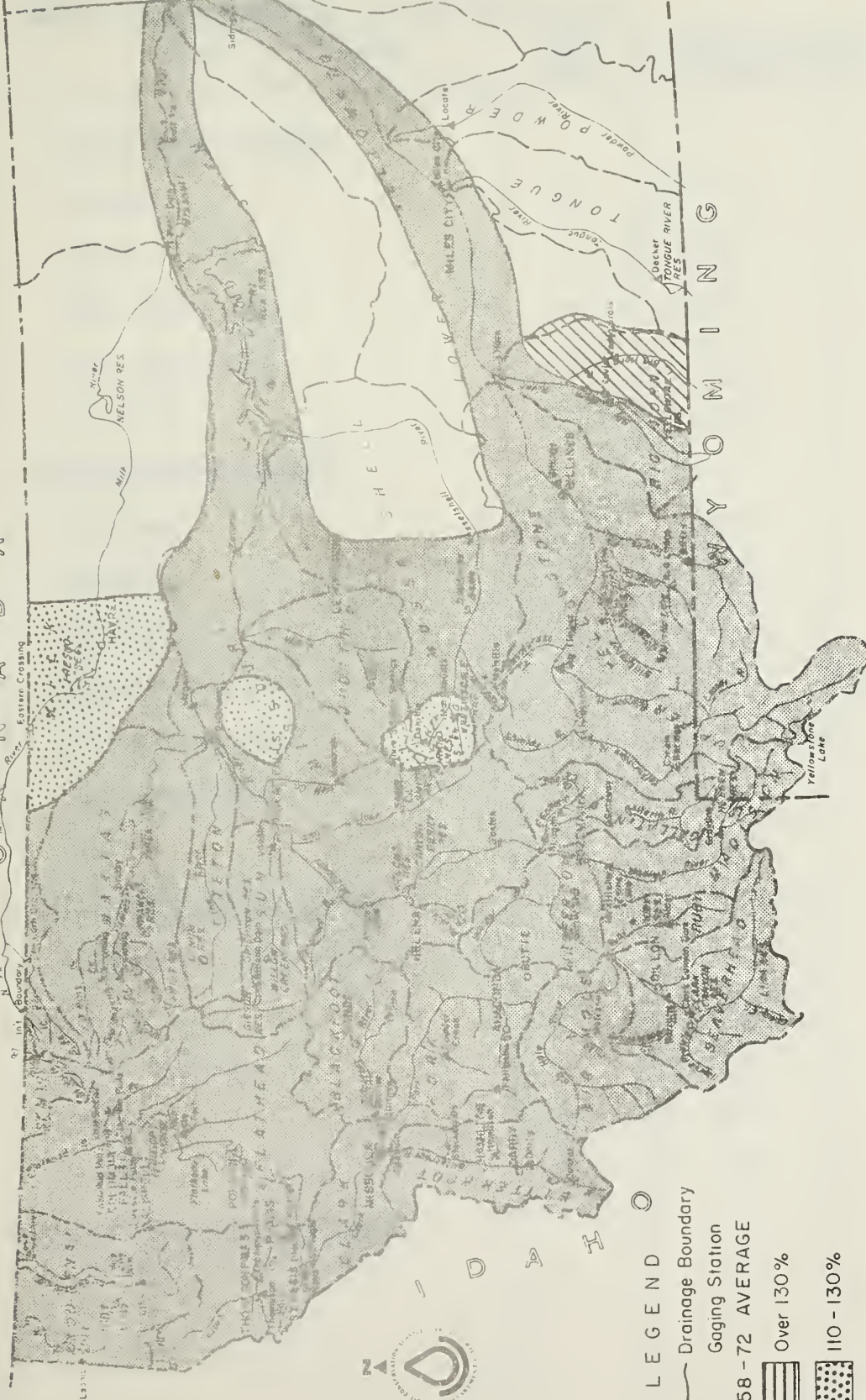
Streamflow. Forecasts of runoff are near record low volumes on most streams. Runoff comparable to 1941, 1961 and 1966 is expected. In contrast to the low year on most streams the Little Bighorn River is forecast to have near average runoff. Late season water shortages are anticipated for most headwater streams not having stored water. Flow in the larger rivers will also be low, but the total flow should be larger than withdrawals. However, some lowering of pump intakes or raising of water levels at diversion points may be necessary.

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LEGEND  
 — Drainage Boundary  
 ▲ Gaging Station

% 1958-72 AVERAGE

Over 130%

110-130%

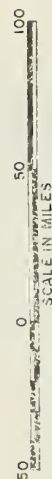
90-110%

70-90%

Under 70%

MONTANA

PROSPECTIVE STREAMFLOW FORECASTS  
 AS OF  
 February 1, 1977



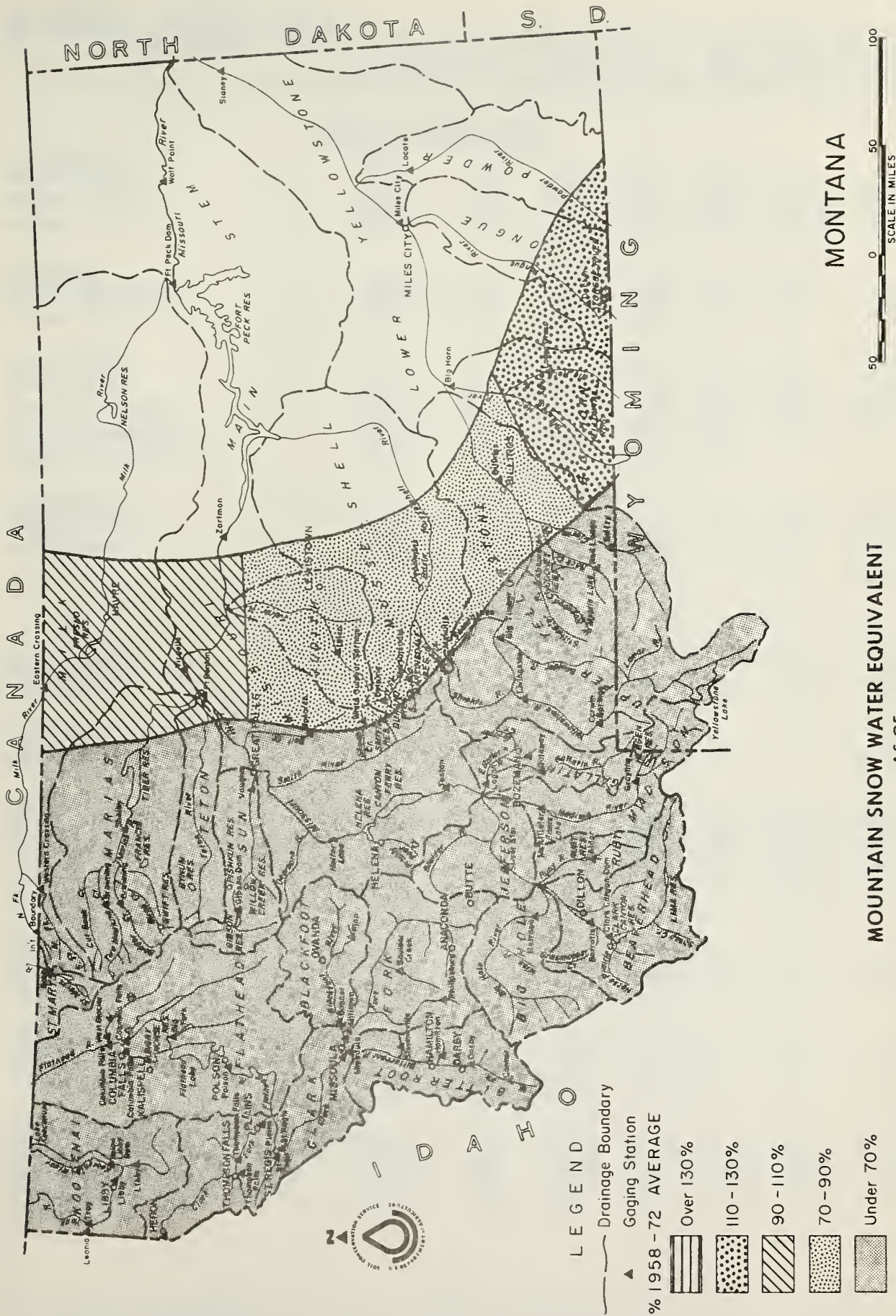


# SUMMARY of SNOW MEASUREMENTS (COMPARISON WITH PREVIOUS YEARS)

RIVER BASIN and/or SUB-WATERSHED	Number of Courses Averaged	THIS YEAR'S SNOW WATER AS PERCENT OF:	
		Last Year	Average
<u>COLUMBIA RIVER DRAINAGE</u>			
Kootenai	22	42	41
Flathead	8	41	35
Upper Clark Fork	22	37	47
Lower Clark Fork	4	33	31
Bitterroot	6	30	36
<u>MISSOURI RIVER DRAINAGE</u>			
Jefferson	20	28	32
Madison	11	28	32
Gallatin	11	43	50
Missouri Main Stem	7	49	57
Judith-Musselshell	4	66	69
Marias-Teton-Sun	1	34	26
Milk	3	68	52
<u>YELLOWSTONE RIVER DRAINAGE</u>			
Yellowstone (above Bighorn)	15	41	51
Big Horn	15	69	86
Little Big Horn	7	90	114
Tongue	11	80	96
Powder	6	46	57
<u>SASKATCHEWAN RIVER DRAINAGE</u>			
St. Mary's	1	34	26
-5-			











# SOIL MOISTURE February 1, 1977

DRAINAGE BASIN and/or STATION		Profile (Inches)		Date of Survey	Soil Moisture (Inches)		
Name	Elevation	Depth	Capacity		This Year	Last Year	Average †
COLUMBIA RIVER BASIN							
Kootenai							
Baree Trail	3800	48	7.5	2-1	4.7	-	-
Murphy Lake R. S.	3000	48	22.6	2-1	19.0	19.5	19.4
Raven	3050	48	23.0	2-1	13.6	16.9	18.7
Flathead							
Desert Mountain	5600	54	8.4	1-26	5.3	8.7	7.1
Marias Pass	5250	54	6.5	1-19	3.6	6.2	5.1
Clark Fork							
Black Pine	7100	48	10.0	1-28	6.5	8.4	7.5
Lubrecht Forest	4100	48	26.8	1-28	14.0	23.8	16.4
Seeley Lake R. S.	4030	48	11.9	2-1	4.8	11.7	7.9
Skalkaho Summit	7260	48	10.8	1-27	8.5	-	-
Bitterroot							
Gibbons Pass	7100	48	7.1	1-27	3.5	5.9	4.9
Lolo Pass	5250	48	10.6	1-27	7.1	7.3	6.0
MISSOURI RIVER BASIN							
Beaverhead							
Lakeview	6700	48	15.3	1-31	8.1	10.9	9.1
Madison							
West Yellowstone	6700	48	6.5	1-31	1.3	1.9	2.5
Gallatin							
Bridger Bowl	7250	48	17.0	1-27	15.6	15.0	15.8
College Site No. 2	4856	54	17.7	1-28	8.6	16.8	13.4
Lick Creek	6860	48	18.8	1-28	12.7	14.3	16.2
Twenty-One Mile	7150	48	10.0	1-31	2.2	3.8	4.6
Missouri Main Stem							
Kings Hill	7420	48	11.8	1-26	4.5	7.7	7.0
Stemple Pass	6350	48	5.9	1-28	3.5	5.3	4.1
Milk							
Beaver Creek	3950	48	20.9	1-26	7.2	8.6	7.8
Rocky Boy	4700	36	10.1	1-26	7.1	8.5	7.4
Yellowstone							
Battle Ridge	6020	48	17.6	1-26	8.8	12.7	13.1
Northeast Entrance	7350	48	9.4	2-1	4.3	4.9	5.9
PMC Dryland	3700	48	20.7	1-24	5.8	5.9	-

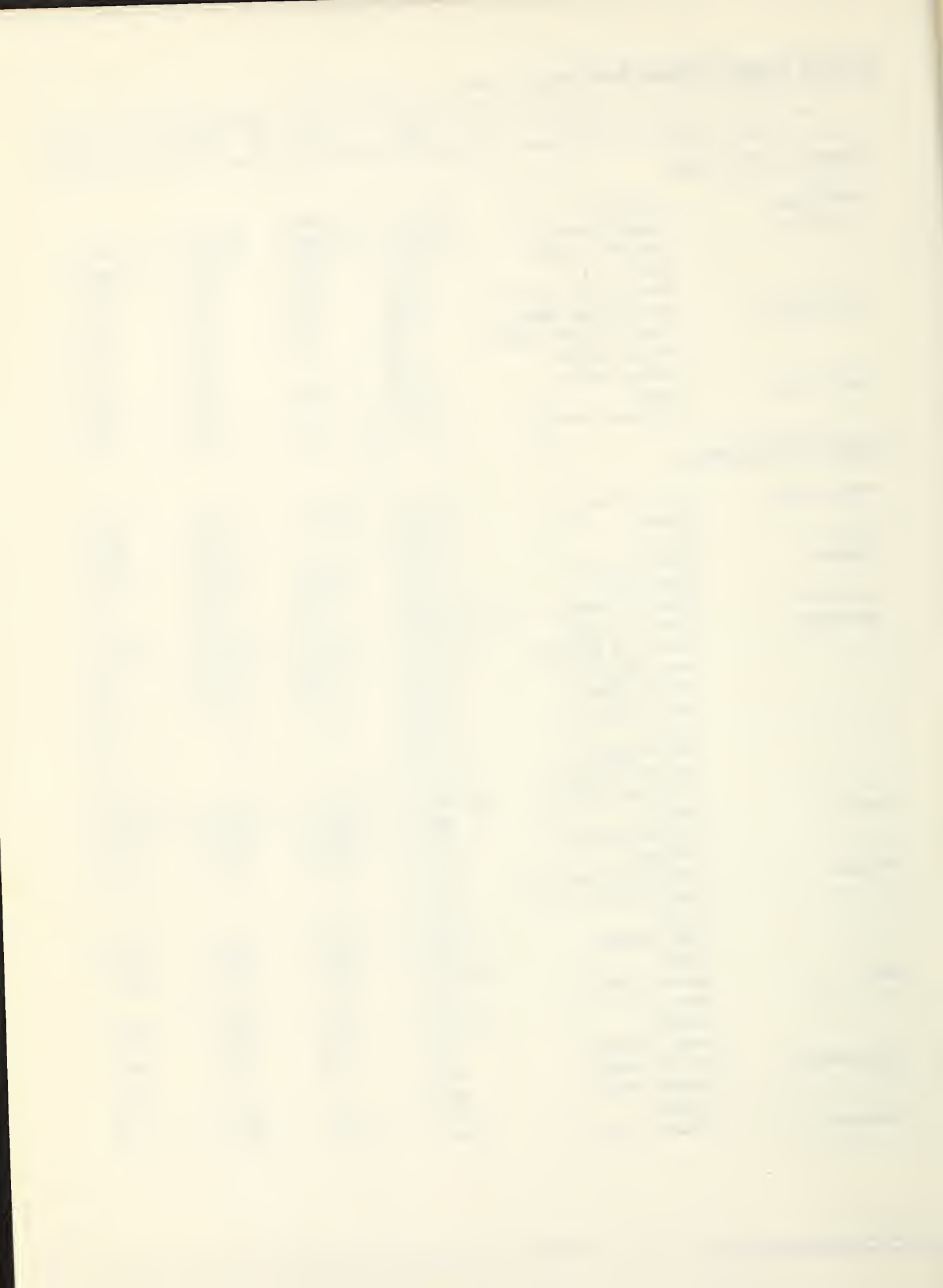


**RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH**

Basin or Stream	RESERVOIR	Usable Capacity	Usable Storage		
			This Year	Last Year	Average
COLUMBIA RIVER BASIN					
Kootenai	Koocanusa	5,694.0	3,157.0	3,734.0	-
Flathead	Hungry Horse	3,428.0	2,428.0	2,953.0	2,484.0
	Flathead Lake	1,791.0	897.8	1,462.0	1,246.0
	Camas (4)	45.2	15.3	16.6	23.0
	Mission Valley (8)	100.3	45.3	54.8	33.2
Clark Fork	Georgetown Lake	31.0	29.8	30.7	27.0
	Lower Willow Creek	4.9	2.4	3.5	1.2
	Nevada Creek	12.6		9.0	4.8
	Noxon Rapids	334.6	269.1	295.5	320.8
Bitterroot	Como	34.9		9.0	11.0
	Painted Rocks	31.7	2.0	23.2	22.0

**MISSOURI RIVER BASIN**

Beaverhead	Clark Canyon	328.9	158.7	153.0	140.6
	Lima	84.0		45.3	31.6
Ruby	Ruby	38.8		21.6	23.4
Madison	Hebgen Lake	377.5	221.8	288.3	201.5
	Ennis Lake	41.0	33.6	34.2	37.7
Gallatin	Middle Creek	8.0	3.1	3.6	3.3
Missouri	Canyon Ferry	2,043.0	1,773.0	1,773.0	1,639.0
	Hauser & Helena	61.9	57.3	63.0	58.0
	Lake Helena	10.4	8.8	10.9	9.2
	Holter Lake	81.9	81.1	78.6	61.8
	Smith River	10.6		-	5.8
	Bair	7.0		-	4.2
	Martinsdale	23.1		-	7.5
	Deadman's Basin	72.2		-	43.6
	Fort Peck Lake	19,140.0	16,260.0	17,540.0	13,220.0
Sun	Gibson	99.0	64.1	67.9	39.1
	Willow Creek	32.2	26.6	27.6	18.9
	Pishkun	32.0	16.4	17.6	17.5
Marias	Lower Two Medicine	11.9		-	-
	Four Horns	19.2		-	-
	Swift	30.0	18.0	21.9	16.2
	Lake Frances	111.9	78.6	93.3	78.0
	Tiber	1,347.0	498.7	581.3	577.1
Milk	Beaver Creek	3.5	1.5	1.3	
	Fresno	127.2	66.2	105.6	56.2
	Nelson	66.8	47.1	50.6	42.6
	Lake Sherburne	66.2	14.8	30.2	18.5
Yellowstone	Mystic Lake	21.0	3.7	7.2	10.9
	Tongue River	68.0		34.4	27.8
	Cooney	27.4	13.7	12.0	13.8
Bighorn	Bighorn Lake	1,356.0	905.6	868.4	792.5



# STREAMFLOW FORECASTS

BASIN, STREAM and/or FORECAST POINT	THIS YEAR			PAST RECORD	
	FORECAST		FORECAST PERIOD	THOUSAND ACRE FEET	
	Thousand Acre Feet	Percent of Average		Last Year	Average

## COLUMBIA RIVER BASIN

KOOTENAI RIVER					
Libby (near) (2)	4,750	64	Apr-Sept	8,012	7,456
Below Libby Dam	4,000	62	Apr-Sept	6,262	6,417
	3,150	63	Apr-June		5,011
FISHER RIVER					
Libby (near)	110	38	Apr-Sept		286
	100	37	Apr-July		269
YAAK RIVER					
Troy (near)	280	49	Apr-Sept		568
	250	46	Apr-July		544
KOOTENAI RIVER					
Leonia (at) (2)	5,400	60	Apr-Sept		9,073
	4,650	58	Apr-July		7,957
	3,800	59	Apr-June		6,431
FLINT CREEK					
Boulder Creek (Below) (3)	38.0	53	Apr-Sept		71.6
	28.0	50	Apr-July		56.1
MIDDLE FORK ROCK CREEK					
Philipsburg (near)	35.0	46	Apr-Sept		75.9
	30.0	44	Apr-July		68.6
NEVADA CREEK					
Finn (near)	6.5	30	Apr-Sept		21.6
	6.0	30	Apr-July		20.1
BLACKFOOT RIVER					
Bonner (near)	540	52	Apr-Sept		1,031
	450	48	Apr-July		934
	380	47	Apr-June		814
CLARK FORK RIVER					
Milltown (above) (4)	360	45	Apr-Sept		792
	300	43	Apr-July		690
	240	41	Apr-June		590
CLARK FORK RIVER					
Missoula (above)	900	49	Apr-Sept	2,649	1,823
	750	46	Apr-July	2,389	1,624
	620	44	Apr-June	2,106	1,404
INFLOW LOWER WILLOW CREEK RESERVOIR					
Hull (Near)	5.5	34	Apr-Sept	28.0	16.2
	5.0	32	Apr-July	26.7	15.4

(2) Adjusted for storage in Lake Koocanusa.

(3) Sum Flint Creek at Maxville and Boulder Creek at Maxville.

(4) Difference in observed flow Clark Fork above Missoula and Blackfoot near Bonner.





# STREAMFLOW FORECASTS

BASIN, STREAM and or FORECAST POINT	THIS YEAR			PAST RECORD	
	FORECAST		FORECAST PERIOD	THOUSAND ACRE FEET	
	Thousand Acre Feet	Percent of Average		Last Year	Average
WEST FORK BITTERROOT RIVER					
Conner (near) (5)	85.0	49	Apr-Sept		172
	75.0	48	Apr-July		156
BITTERROOT RIVER					
Darby (near)	280	48	Apr-Sept	836	584
	250	46	Apr-July	758	542
	220	46	Apr-June	666	479
SKALKAHO CREEK					
Hamilton (near)	33.5	59	Apr-Sept		56.6
	28.0	56	Apr-July		49.6
BURNT FORK CREEK					
Stevensville (near) (10)	23.0	65	Apr-Sept		35.3
	20.0	64	Apr-July		31.0
BITTERROOT RIVER					
Missoula (at) (6)	720	47	Apr-Sept		1,527
	650	46	Apr-July		1,412
	600	48	Apr-June		1,236
CLARK FORK RIVER					
Missoula (below)	1,620	48	Apr-Sept		3,350
	1,400	46	Apr-July		3,036
	1,220	46	Apr-June		2,640
CLARK FORK RIVER					
St. Regis (at)	2,050	45	Apr-Sept	6,119	4,507
	1,800	44	Apr-July	5,504	4,087
	1,600	45	Apr-June	4,794	3,563
NORTH FORK FLATHEAD RIVER					
Columbia Falls (near)	1,200	60	Apr-Sept		1,991
	1,000	55	Apr-July		1,813
	880	57	Apr-June		1,551
MIDDLE FORK FLATHEAD RIVER					
West Glacier (near)	1,200	63	Apr-Sept	1,982	1,917
	1,100	62	Apr-July	1,779	1,768
	980	65	Apr-June	1,458	1,514
SOUTH FORK FLATHEAD RIVER					
Columbia Falls (near) (7)	1,500	63	Apr-Sept	2,489	2,378
	1,450	65	Apr-July	2,345	2,240
	1,250	63	Apr-June	2,038	1,984

- (5) Adjusted for storage in Painted Rocks Reservoir.  
 (6) Difference in observed flow Clark Fork above and below Missoula.  
 (7) Adjusted for storage in Hungry Horse Reservoir  
 (10) Adjusted for diversion into Sunset Highline Canal.



# STREAMFLOW FORECASTS

BASIN, STREAM and/or FORECAST POINT	THIS YEAR			PAST RECORD	
	FORECAST		FORECAST PERIOD	THOUSAND ACRE FEET	
	Thousand Acre Feet	Percent of Average		Last Year	Average
FLATHEAD RIVER					
Columbia Falls (at) (7)	4,000	62	Apr-Sept	6,785	6,421
	3,700	62	Apr-July	6,176	5,942
	3,250	63	Apr-June	5,200	5,151
SWAN RIVER					
Big Fork (near)	430	60	Apr-Sept		717
	380	60	Apr-July		630
FLATHEAD RIVER					
Polson (near) (8)	4,400	58	Apr-Sept	8,187	7,648
	4,130	58	Apr-July	7,343	7,082
	3,700	61	Apr-June	6,160	6,113
CLARK FORK RIVER					
Plains (near) (8)	6,700	53	Apr-Sept	14,454	12,601
	6,000	52	Apr-July	12,967	11,523
	5,200	52	Apr-June	10,996	9,934
THOMPSON RIVER					
Thompson Falls (near)	95.0	34	Apr-Sept		277
	80.0	32	Apr-July		248
PROSPECT CREEK					
Thompson Falls (at)	55.0	37	Apr-Sept		147
	50.0	36	Apr-July		137
CLARK FORK RIVER					
Whitehorse Rapids (at) (9)	7,400	53	Apr-Sept		14,336
	6,700	52	Apr-July		13,086
	5,800	52	Apr-June		11,325

- (7) Adjusted for storage in Hungry Horse Reservoir.  
 (8) Adjusted for storage in Hungry Horse Reservoir and Flathead Lake.  
 (9) Adjusted for storage in Hungry Horse Reservoir, Flathead Lake, and Noxon Rapids Reservoirs.



# STREAMFLOW FORECASTS

BASIN, STREAM and/or FORECAST POINT	THIS YEAR			PAST RECORD	
	FORECAST		FORECAST PERIOD	THOUSAND ACRE FEET	
	Thousand Acre Feet	Percent of Average		Last Year	Average

## MISSOURI RIVER BASIN

BEAVERHEAD RIVER					
Grant (near) (11) (12)	42.0	30	Apr-Sept	244	145
	41.0	31	Apr-July	202	127
RUBY RIVER					
Alder (near)	53.0	56	Apr-Sept		93.9
	41.0	52	Apr-July		79.4
BIG HOLE RIVER					
Melrose (near)	295	39	Apr-Sept		748
	275	40	Apr-July		694
BIRCH CREEK					
Glen (near)	6.8	50	Apr-Sept		13.7
	5.2	45	Apr-July		11.5
BOULDER RIVER					
Boulder (near)	44.5	50	Apr-Sept	145	89.5
	42.5	50	Apr-July	134	85.3
WILLOW CREEK					
Harrison (near)	5.5	29	Apr-Sept		18.9
	5.0	29	Apr-July		17.1
MADISON RIVER					
Grayling (near) (13)	335	70	Apr-Sept	575	480
	255	68	Apr-July	449	374
MADISON RIVER					
McAllister (near) (14)	560	68	Apr-Sept	994	828
	450	69	Apr-July	792	652
GALLATIN RIVER					
Gateway (near)	310	58	Apr-Sept		531
	265	58	Apr-July		451

- (11) Adjusted for storage in Lima Reservoir.  
 (12) Adjusted for storage in Clark Canyon Reservoir.  
 (13) Adjusted for storage in Hebgen Lake.  
 (14) Adjusted for storage in Hebgen and Ennis Lakes.





# STREAMFLOW FORECASTS

BASIN, STREAM and/or FORECAST POINT	THIS YEAR			PAST RECORD	
	FORECAST		FORECAST PERIOD	THOUSAND ACRE FEET	
	Thousand Acre Feet	Percent of Average		Last Year	Average
HYALITE CREEK					
Bozeman (near) (15)	29.7	67	Apr-Sept		44.2
	25.7	67	Apr-July		38.2
GALLATIN RIVER					
Logan (at)	230	40	Apr-Sept		573
	185	38	Apr-July		487
MISSOURI RIVER					
Toston (at) (16)	1,100	45	Apr-Sept		2,432
	885	42	Apr-July		2,109
SHEEP CREEK					
White Sulphur Springs (near)	14.5	70	Apr-Sept		20.6
	12.4	69	Apr-July		18.0
SUN RIVER					
Gibson Dam (at) (17)	345	58	Apr-Sept	703	590
	315	58	Apr-July	643	541
BELT CREEK					
Monarch (near)	72.0	58	Apr-Sept		123
	65.0	58	Apr-July		113
MISSOURI RIVER					
Fort Benton (at) (18)	1,700	46	Apr-Sept		3,690
	1,300	42	Apr-July		3,123
TWO MEDICINE CREEK					
Browning (near) (19)	128	50	Apr-Sept		253
	125	52	Apr-July		240
BADGER CREEK					
Browning (near)	72.0	55	Apr-Sept		130
	60.0	53	Apr-July		113
MARIAS RIVER					
Shelby (near) (20)	180	32	Apr-Sept		599
	170	32	Apr-July		538

- (15) Adjusted for storage in Middle Creek Reservoir.
- (16) Adjusted for storage in Hebgen and Ennis Lakes and Clark Canyon Reservoir.
- (17) Adjusted for storage in Gibson Reservoir and diversions.
- (18) Adjusted for storage in Canyon Ferry Reservoir.
- (19) Adjusted for storage in Two Medicine Reservoir and diversions into Two Medicine Canal.
- (20) Adjusted for storage in Two Medicine, Four Horns, Lake Frances, and Swift Reservoirs.



# STREAMFLOW FORECASTS

BASIN, STREAM and or FORECAST POINT	THIS YEAR			PAST RECORD	
	FORECAST		FORECAST PERIOD	THOUSAND ACRE FEET	
	Thousand Acre Feet	Percent of Average		Last Year	Average
MISSOURI RIVER					
Virgelle (at) (21)	1,900	44	Apr-Sept		4,342
	1,500	40	Apr-July		3,742
SOUTH FORK JUDITH RIVER					
Utica (near)	9.5	64	Apr-Sept		14.9
	8.5	62	Apr-July		13.7
MISSOURI RIVER					
Landusky (near) (21)	1,950	41	Apr-Sept		4,739
	1,500	37	Apr-July		4,068
NORTH FORK MUSSELSHELL RIVER					
Delpine (near)	4.3	69	Apr-Sept		6.2
	3.5	65	Apr-July		5.4
SOUTH FORK MUSSELSHELL RIVER					
Martinsdale (above)	35.0	70	Apr-Sept		50.1
	33.5	71	Apr-July		47.3
MISSOURI RIVER					
Fort Peck Dam (below) (22)	1,600	35	Apr-Sept		4,598
	1,400	34	Apr-July		4,069
MILK RIVER					
Eastern Crossing (at)	250	87	Apr-Sept		286
MISSOURI RIVER					
Wolf Point (near) (22)	1,700	35	Apr-Sept		4,898
	1,500	34	Apr-July		4,361
MISSOURI RIVER					
Williston, N.D. (near) (29)	5,200	44	Apr-Sept		11,778
	4,600	44	Apr-July		10,437

## SASKATCHEWAN RIVER BASIN

ST. MARY RIVER					
Babb (near) (30)	320	65	Apr-Sept		489
	270	64	Apr-July		421

- (21) Adjusted for storage in Canyon Ferry and Tiber Reservoirs.
- (22) Adjusted for storage in Canyon Ferry, Tiber, and Fort Peck Reservoirs.
- (29) Adjusted for storage in Canyon Ferry, Tiber, Fort Peck, Buffalo Bill, Boysen and Yellowtail Reservoirs. Sum Yellowstone River near Sidney and Missouri River near Culbertson.
- (30) Adjusted for storage in Lake Sherburne.



# STREAMFLOW FORECASTS

BASIN, STREAM and/or FORECAST POINT	THIS YEAR			PAST RECORD	
	FORECAST		FORECAST PERIOD	THOUSAND ACRE FEET	
	Thousand Acre Feet	Percent of Average		Last Year	Average
YELLOWSTONE RIVER					
Corwin Springs (at)	1,240	62	Apr-Sept	2,453	1,996
	1,020	61	Apr-July	2,089	1,662
YELLOWSTONE RIVER					
Livingston (near)	1,300	56	Apr-Sept		2,317
	1,070	56	Apr-July		1,926
BOULDER RIVER					
Big Timber (at)	215	57	Apr-Sept		379
	200	57	Apr-July		350
STILLWATER RIVER					
Absarokee (near) (25)	340	58	Apr-Sept		591
	280	57	Apr-July		494
CLARKS FORK RIVER					
Belfry (near)	385	63	Apr-Sept		607
	360	66	Apr-July		546
ROCK CREEK					
Red Lodge (near)	72.0	65	Apr-Sept	133	110
	52.0	62	Apr-July	104	84.0
INFLOW COONEY RESERVOIR					
Boyd (near)	26.0	50	Apr-Sept		51.5
	20.0	49	Apr-July		41.1
YELLOWSTONE RIVER					
Billings (at)	2,300	54	Apr-Sept	5,711	4,246
	1,950	54	Apr-July	4,876	3,613
BIGHORN RIVER					
St. Xavier (near) (26)	850	46	Apr-Sept	2,077	1,849
	750	44	Apr-July	1,846	1,706
LITTLE BIGHORN RIVER					
Lodgegrass (near) (28)	150	103	Apr-Sept		146
	135	105	Apr-July		129
YELLOWSTONE RIVER					
Miles City (at) (27)	3,300	52	Apr-Sept		6,378
	2,850	51	Apr-July		5,555
YELLOWSTONE RIVER					
Sidney (near) (27)	3,400	51	Apr-Sept		6,665
	2,950	50	Apr-July		5,895

(25) Adjusted for storage in Mystic Lake.

(26) Adjusted for storage in Buffalo Bill, Boysen, Bull Lake, and Yellowtail Reservoirs.

(27) Adjusted for storage in Buffalo Bill, Boysen and Yellowtail Reservoirs.

(28) Sum Little Bighorn below Pass Creek and Lodgegrass Creek near Wyola.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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# SNOW

DRAINAGE BASIN and/or SNOW COURSE		THIS YEAR			PAST RECORD	
		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	Elevation				Last Year	Average
ARCH FALLS	7350	1/28	18	3.9	12.3	8.7
BANFIELD MOUNTAIN	5600	1/27	18	3.6	15.8	19.1
BANFIELD MOUNTAIN PILLOW	5600	1/27	SP	4.8	14.3	16.0
BASIN CREEK	7180	1/27	11	1.6	-	-
BATTLE RIDGE	6020	1/26	18	3.8	6.7	6.5
BEAR PAW SKI AREA	5200	1/26	19	4.2	3.5	4.7
BIG COULEE	5100	1/25	21	6.0	2.5	-
BIG SKY	7700	1/30	25	6.5	13.4	10.6
BIG SPRINGS (ID)	6500	1/31	23	3.4	15.3	14.4
BLACK BEAR	7950	1/28	33	8.1	34.0	-
BLACK BEAR PILLOW	7950	1/28	SP	9.1	28.9	-
BLACK PINE	7100	1/28	18	4.3	12.4	7.6
BLACK PINE PILLOW	7100	1/28	SP	4.8	14.6	9.4
BRIDGER BOWL	7250	1/27	36	11.2	23.7	20.4
BRIDGER BOWL PILLOW	7250	1/27	SP	11.2	22.3	18.9
BRISTOW CREEK	3900	1/27	8	1.5	5.6	-
BULL MOUNTAIN	6600	1/28	11	2.6	4.4	-
CALVERT CREEK	6450	1/27	17	3.3	-	-
CALVERT CREEK PILLOW	6450	1/27	SP	2.8	7.4	-
CAMP CREEK (ID)	6800	2/01	8	1.9	6.3	7.4
CANYON (WY)	7750	2/01	22	4.1	13.8	10.7
CARROT BASIN	9000	1/25	34	9.0	28.1	27.9
CARROT BASIN PILLOW	9000	1/25	SP	7.6	21.2	19.9
CARTER CREEK	7400	1/28	7	.9	4.7	3.5
CEDAR GROVE	4100	1/28	10	3.0	7.3	-
CHESSMAN RESERVOIR	6200	1/31	6	1.9	1.5	2.5
CHICKEN CREEK	4060	1/21	27	6.2	-	-
COLE CREEK	7850	1/28	27	7.0	13.4	-
COLE CREEK PILLOW	7850	1/28	SP	6.5	13.1	-
COMBINATION	5600	1/28	13	2.3	4.8	5.6
COMBINATION PILLOW	5600	1/28	SP	3.2	4.7	-
COOKE STATION	8150	1/25	32	8.6	20.0	-
COPPER MOUNTAIN	7700	1/31	14	2.8	11.6	8.0
COYOTE HILL	4200	2/01	22	5.0	8.8	8.3
DALY CREEK	5780	1/28	171	3.4	9.4	-
DAVIS CREEK	5400	1/26	18	3.4	15.8	-
DEADMAN CREEK	6450	1/26	30	7.4	9.2	8.1
DEADMAN CREEK PILLOW	6450	1/26	SP	7.1	7.6	8.1
DESERT MOUNTAIN	5600	1/27	21	5.2	9.4	11.9
DEVILS SLIDE	8100	1/28	35	9.8	19.1	15.3
DISCOVERY BASIN	7050	1/26	20	4.2	9.2	-
EMERY CREEK	4350	1/27	23	5.4	9.1	-
EMERY CREEK PILLOW	4350	1/27	SP	5.0	-	-
FISH CREEK	8000	1/27	12	2.3	-	-
FISHER CREEK	9100	1/25	52	15.1	33.0	24.8
FISHER CREEK PILLOW	9100	1/25	SP	14.4	31.6	25.5
FLEECER RIDGE	7500	1/28	18	4.1	11.8	-
FOURTH OF JULY	3450	1/28	8	1.4	-	-



## SNOW

DRAINAGE BASIN and/or SNOW COURSE		THIS YEAR			PAST RECORD	
		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	
NAME	Elevation				Last Year	Average
FRIDAY HILL	4620	1/28	18	5.0	-	-
FROHNER MEADOWS	6480	1/27	15	3.8	6.4	-
FROHNER MEADOWS PILLOW	6480	1/27	SP	3.5	6.5	-
GARVER CREEK	4250	1/26	9	1.8	4.7	9.9
GARVER CREEK PILLOW	4250	2/01	SP	3.4	6.2	8.6
GIBBONS PASS	7100	1/27	23	5.9	20.6	16.0
GRAVE CREEK	4300	1/25	16	3.8	10.3	-
GRAVE CREEK PILLOW	4300	1/25	SP	4.9	10.4	-
GRIZZLY PEAK	8400	1/28	27	7.2	13.0	11.6
HAWKINS LAKE	6450	1/26	22	5.7	25.4	23.2
HAWKINS LAKE PILLOW	6450	1/26	SP	6.2	22.8	21.6
HEBGEN DAM	6550	1/28	23	5.1	11.4	8.2
HELL ROARING DIVIDE	5770	1/26	38	10.5	21.0	23.3
HERRIG JUNCTION	4850	1/21	31	7.4	-	-
HIGHWOOD DIVIDE	5650	1/25	29	8.0	7.6	-
HIGHWOOD STATION	4600	1/25	21	6.7	2.5	-
HOOD MEADOW	6600	1/28	17	3.8	9.8	7.9
HOODOO BASIN PILLOW	6000	1/31	SP	9.7	35.4	36.1
INTERGAARD	6450	2/01	13	2.1	10.0	6.0
ISLAND PARK (ID)	6310	1/31	21	3.1	12.9	11.6
KILGORE (ID)	6200	1/27	12	1.6	7.9	7.9
KING CREEK SADDLE	4550	1/30	17	3.9	-	-
KING SPRINGS	4150	1/30	16	3.1	-	-
KINGS HILL	7500	1/26	28	7.2	11.6	-
LAKE CAMP (WY)	7850	2/01	14	1.8	8.8	6.0
LAKE CREEK	6100	1/31	12	2.4	7.2	4.9
LAKEVIEW CANYON	6930	1/31	12	2.0	8.2	9.8
LAKEVIEW RIDGE	7400	1/31	10	1.5	7.6	8.8
LICK CREEK	6860	1/28	18	3.7	9.3	6.8
LICK CREEK PILLOW	6860	1/28	SP	5.8	8.6	6.1
LOLO PASS (ID)	5230	1/30	27	6.6	24.7	22.9
LOLO PASS PILLOW	5230	1/31	SP	5.6	-	-
LONE MOUNTAIN	8880	1/30	30	7.8	20.6	17.0
LOOKOUT (ID)	5250	1/31	29	7.0	23.4	26.7
LOST HORSE	5940	1/26	31	8.0	-	-
LOST SOUL	4800	1/27	14	3.2	9.0	-
LUBRECHT FLUME	4800	1/28	13	2.8	6.3	5.6
LUBRECHT FLUME PILLOW	4800	1/28	SP	2.6	-	4.5
LUBRECHT FOREST # 3	5450	1/28	14	3.2	5.9	5.6
LUBRECHT FOREST # 4	4650	1/28	7	1.2	1.8	3.2
LUBRECHT FOREST # 6	4040	1/31	8	1.9	2.2	3.8
LUBRECHT HYDROPLOT	4200	1/28	13	2.3	6.0	5.1
LUPINE CREEK (WY)	7300	1/31	14	2.6	9.2	7.7
MADISON PLATEAU	7750	1/28	21	4.5	19.6	15.4
MADISON PLATEAU PILLOW	7750	1/28	SP	6.6	19.6	16.6
MARIAS PASS	5250	2/02	14	3.4	9.9	13.2
MAYNARD CREEK	6210	1/27	26	6.5	11.8	13.7
MAYNARD CREEK PILLOW	6210	1/27	SP	6.7	7.8	8.8
MEADOW CREEK PILLOW	4000	1/31	SP	4.7	3.4	-
MISSION MOUNTAIN	5050	1/30	17	3.5	-	-





# SNOW

DRAINAGE BASIN and/or SNOW COURSE		THIS YEAR			PAST RECORD	
		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
					Last Year	Average
NAME	Elevation					
MOOSE CREEK (ID)	6200	1/31	21	4.0	14.1	11.8
MOULTON RESERVOIR	6850	1/28	11	1.5	-	-
MOUNT LOCKHART	6400	1/31	24	6.2	19.6	-
MOUNT LOCKHART PILLOW	6400	1/31	SP	6.3	15.8	15.6
NEW WORLD	6900	1/27	23	5.4	15.0	10.2
NEWTON MOUNTAIN	5600	1/28	25	6.8	-	-
NEZ PERCE CREEK	6500	1/31	11	1.4	6.3	5.4
NOISY BASIN	6040	1/28	64	21.0	27.9	-
NOISY BASIN PILLOW	6040	1/28	SP	17.6	25.5	-
NOISY CREEK	3600	1/28	17	4.3	2.4	-
NORRIS BASIN (WY)	7500	1/30	17	2.9	10.7	8.0
NORTH FK. ELK CREEK	6250	1/31	19	4.7	11.2	8.6
NORTH FK. ELK CREEK PILL	6250	1/31	SP	4.0	11.2	8.4
NORTHEAST ENTRANCE	7400	2/01	19	4.0	10.6	6.6
OLD FAITHFUL (WY)	7360	1/28	12	3.0	13.2	-
PETERSON MEADOWS	7200	1/31	14	3.1	11.1	6.3
PETERSON MEADOWS PILLOW	7200	1/31	SP	3.0	11.2	-
PICNIC GROUNDS	6200	2/01	8	1.2	3.6	3.0
PIKE CREEK	5930	1/23	28	7.7	-	-
PIKE CREEK PILLOW	5930	1/23	0	8.0	-	-
PIPESTONE PASS	7200	1/31	7	1.1	6.4	3.8
POORMAN CREEK	5100	1/28	30	10.0	20.7	26.8
POORMAN CREEK PILLOW	5100	2/01	SP	9.9	17.8	22.8
RED TOP	5260	1/28	23	5.8	-	-
ROCKER PEAK	8000	1/28	20	5.1	15.9	11.1
ROCKER PEAK PILLOW	8000	1/28	SP	4.3	14.9	11.4
ROCKY BOY	4700	1/26	16	3.4	2.7	3.4
ROCKY BOY PILLOW	4700	1/26	SP	4.3	3.6	3.8
SADDLE MOUNTAIN	7940	1/27	25	6.4	22.2	18.4
SADDLE MOUNTAIN PILLOW	7940	1/27	SP	6.9	22.8	19.1
SAWTELL MOUNTAIN (ID)	8710	1/31	26	5.1	22.2	26.1
SHOWER FALLS	8100	1/28	41	12.0	21.1	16.6
SHOWER FALLS PILLOW	8100	1/28	SP	11.2	20.4	16.7
SILVER RUN	6630	1/28	11	1.9	-	-
SILVER RUN PILLOW	6630	1/28	0	1.9	-	-
SKALKAH0 SUMMIT PILLOW	7260	1/27	0	6.1	-	-
SPUR PARK	8000	1/26	36	9.8	17.0	16.7
SPUR PARK PILLOW	8100	1/26	SP	11.5	17.7	16.4
STAHL PEAK	6050	1/25	38	10.8	28.8	-
STAHL PEAK PILLOW	6050	1/25	SP	10.5	24.0	-
STORM LAKE	7780	1/31	18	4.8	13.8	9.5
STRYKER BASIN	6180	1/21	38	10.4	-	-
STUART MILL	6500	2/01	10	1.8	5.8	4.8
SYLVAN PASS (WY)	7100	1/30	20	3.8	14.7	9.4
TARGHEE PASS (ID)	7000	1/31	20	2.6	11.1	12.0
TAYLOR ROAD	4080	1/26	16	4.6	1.2	-
TEN MILE LOWER	6600	1/30	14	2.8	5.2	5.4
TEN MILE MIDDLE	6800	1/29	20	3.7	11.3	8.2
TEN MILE UPPER	8000	1/29	20	4.7	12.7	10.1
TEPEE CREEK	8000	1/31	17	3.2	12.6	11.7





## SNOW

DRAINAGE BASIN and/or SNOW COURSE		THIS YEAR			PAST RECORD	
		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	Elevation				Last Year	Average
TEPEE CREEK PILLOW	8000	1/31	SP	3.6	10.3	-
THUMB DIVIDE (WY)	7900	1/31	16	2.8	15.4	15.4
TV MOUNTAIN	6800	2/01	19	4.2	14.9	13.2
TWELVEMILE CREEK	5600	1/26	27	7.3	17.3	15.6
TWELVEMILE CREEK PILLOW	5600	1/26	SP	5.5	15.5	13.4
TWENTY-ONE MILE	7150	1/28	21	4.4	15.5	12.7
TWIN LAKES	6510	1/26	39	11.1	-	30.0
TWIN LAKES PILLOW	6400	1/26	SP	10.9	36.8	30.4
VALLEY VIEW (ID)	6500	1/31	20	2.2	12.0	12.3
WALDRON	5600	1/31	14	3.4	6.4	-
WALDRON PILLOW	5600	1/31	SP	3.4	6.2	9.9
WEASEL DIVIDE	5450	1/25	27	7.3	24.2	-
WEST YELLOWSTONE	6700	1/28	15	2.8	11.1	8.2
WEST YELLOWSTONE PILLOW	6700	1/31	SP	1.8	8.3	6.6
WHISKEY CREEK	6800	1/28	21	4.5	17.7	-
WHISKEY CREEK PILLOW	6800	1/28	SP	4.1	14.7	-
WHITE ELEPHANT (ID)	7700	1/31	23	4.1	18.6	-
WHITE MILL	8700	1/25	38	10.8	27.0	-
WHITE MILL PILLOW	8700	1/25	SP	9.1	22.6	-
WILLOW CREEK	6500	1/28	19	3.8	8.1	-
WOLVERINE (WY)	7650	1/30	19	4.0	14.7	-

## LATE ARRIVING DATA

Dix Hill	6400	1/29	18	4.1	9.0	-
Holbrook	4530	1/30	29	6.0A	8.5A	8.0
Many Glacier	4960	2/1	21	5.0	-	-
Many Glacier Pillow	4960	2/1	SP	5.9	-	-
Northeast Entrance Pillow	7400	2/1	SP	3.5	9.8	7.0
Ophir Park	7150	1/29	27	7.4	16.8	-
Spotted Bear Mountain	7000	1/30	27	6.0A	11.0A	11.4



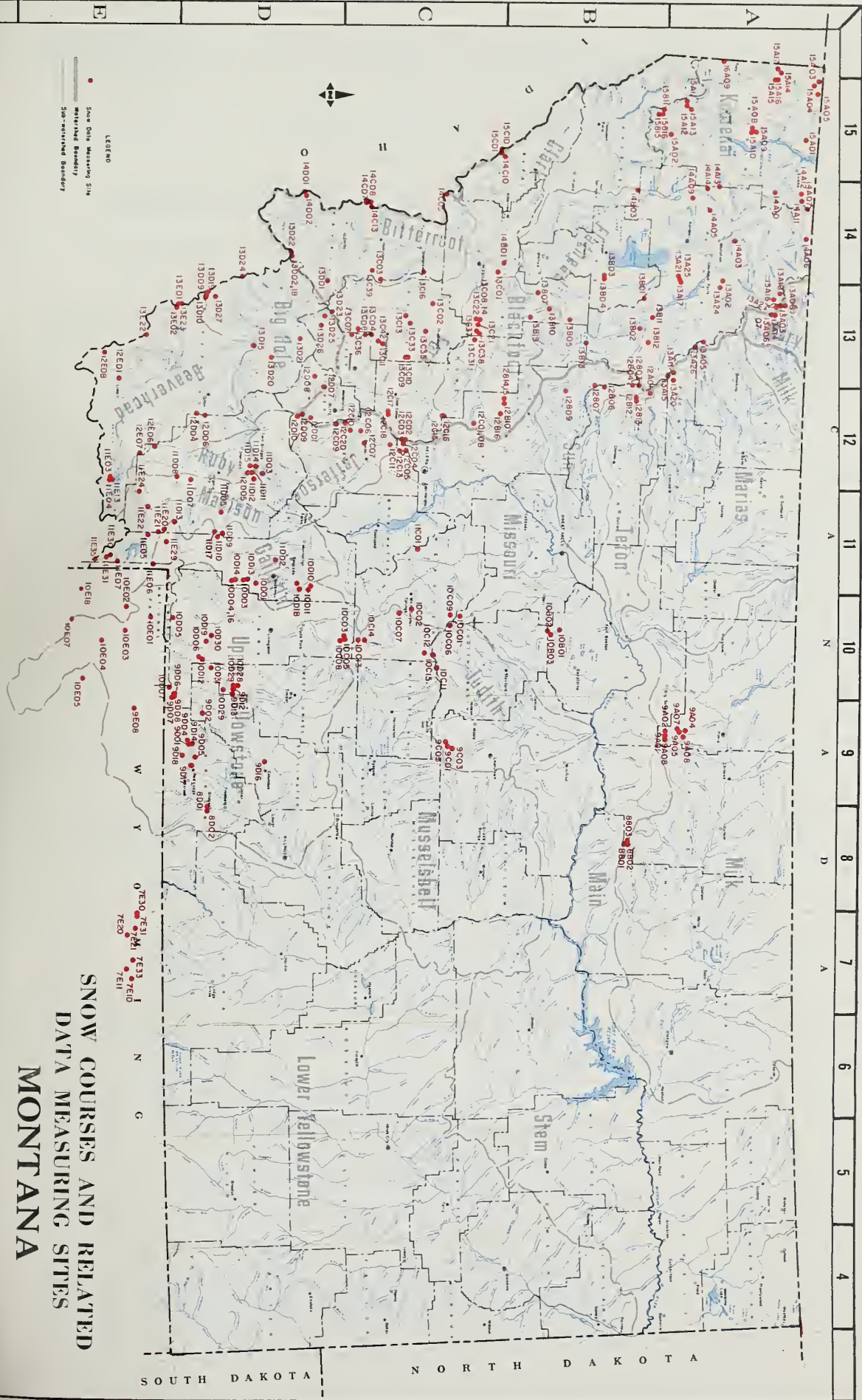
Legend  
 • Snow Data Measuring Site  
 --- Watering Boundary  
 --- Snow-Watered Boundary

# SNOW COURSES AND RELATED DATA MEASURING SITES

## MONTANA

1977

SCALE 1:4,000,000  
 20 0 20 40 60 80 MILES







# Agencies and Organizations Cooperating in Montana Snow Surveys

## GOVERNMENT AGENCIES

### Canada:

Water Survey of Canada, Calgary, Department of the  
Environment  
Water Resources Service, Department of Lands, Forests  
and Water Resources, British Columbia  
Alberta Environment, Edmonton, Alberta

### Federal:

Department of the Army  
Corps of Engineers  
U.S. Department of Agriculture  
Forest Service  
Soil Conservation Service  
U.S. Department of Commerce  
NOAA, National Weather Service  
U.S. Department of the Interior  
Bonneville Power Administration  
Bureau of Indian Affairs  
Bureau of Reclamation  
Fish and Wildlife Service  
Geological Survey  
National Park Service

## STATE

Montana Association of Conservation Districts  
Montana Department of Fish and Game  
Montana Department of Natural Resources and  
Conservation  
Montana State University - Agricultural Experiment  
Station  
University of Montana - School of Forestry

## PRIVATE

Montana Power Company  
Butte Water Company  
The Anaconda Company

Other organizations and individuals furnish valuable  
information for snow survey reports. Their cooperation  
is gratefully acknowledged.

UNITED STATES DEPARTMENT OF AGRICULTURE  
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## FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

Furnishes the basic data  
necessary for forecasting  
water supply for irrigation,  
domestic and municipal water  
supply, hydro-electric power  
generation, navigation,  
mining and industry

*"The Conservation of Water begins  
with the Snow Survey"*

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